Sunlight Angles

Study the two diagrams on page 3 of this handout. In each, solar radiation enters from the right and strikes a solar panel, which is seen in an edge-on view from the side.
In the top diagram, the incoming radiation arrives at an angle of 90° to the face of the solar panel. In the bottom diagram, the angle is 45°.
You can see that more of the radiation is absorbed by the panel in the top diagram than in the bottom. One way to compare these is to count the "rays" of sunlight that strike the panel in each case.
When the sunlight strikes the panel at an angle of 90°, the panel absorbs 50 rays. How many rays does the panel absorb when sunlight strikes at 45°? Put this number into the correct location in the chart below.
Write a fraction that compares the number of rays absorbed at an angle of 45° to the number that is absorbed at an angle of 90°. Change this fraction to a percent. Put that percent into the correct location in the chart below.
In these drawings, the "solar panels" are exactly 3 inches high. Using the diagrams of "sunlight rays" on the following pages, draw 3" lines at various angles to the incoming rays to determine how many rays your "solar panels" will intercept.

Use your data to answer these questions:
1. What percent of incoming sunlight is lost when the sun is at an angle of 85°?
2. Suppose that someone observed that the amount of power being produced by the panels had dropped to 60% of its normal maximum. What sunlight angle would this represent?
3. What angle would cause the power to drop to 50% of its maximum value?
4. Compare the change in power when the sunlight angles moves from 90° to 80° to the change in power when the sunlight angle moves from 40° to 30°.

Angle # of rays absorbed Percent of maximum

	25%	50%	75%	100%
90°				
80°				
70°				
60°				
50°				
45°				
40°				
30°				
20°				
10°				
0°				

Now make a graph that shows the results of your chart.